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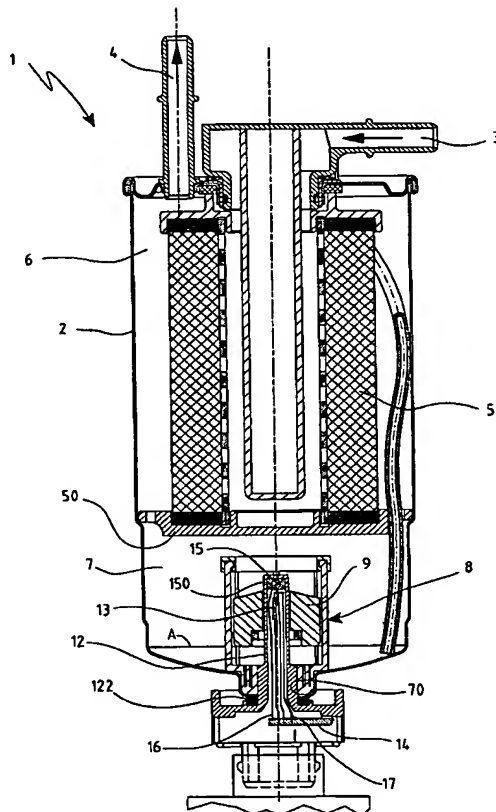
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[Continued on next page]

(54) Title: **FUEL FILTER FOR DIESEL ENGINES WITH HIGH PRESSURE DIRECT INJECTION OF COMMON RAIL TYPE AND THE LIKE**



(57) Abstract: Fuel filter for diesel engines with high pressure direct injection of common rail type and the like, comprising an outer casing provided with a fuel inlet conduit (3) and an outlet conduit (4), and containing in its interior a filter means(5), a temperature sensor(15) being positioned in proximity to the bottom of said casing to measure the temperature of the fuel present in the casing.

WO 2004/051070 A1



Declarations under Rule 4.17:

- *as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii)) for the following designations AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, UZ, VC, VN, YU, ZA, ZM, ZW, ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE,*

DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG)

- *as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii)) for all designations*

Published:

- *with international search report*
- *with amended claims*

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

CLAIMS

1. A fuel filter for diesel engines with high pressure direct injection of common rail type and the like, comprising an outer casing provided with a fuel inlet conduit (3) and an outlet conduit (4), and internally housing a filter means, characterised in that a temperature sensor (15) is positioned in the lower part of said casing to measure the temperature of the fuel present in the casing.
2. A filter as claimed in claim 1, characterised in that said casing presents an upper chamber (6) for containing said filter means, and a lower chamber (7) communicating with said upper chamber to collect the water which said filter means (5) separates from the fuel, means (8) for measuring the level of the water collected in the chamber (7) being associated with said lower chamber.
3. A filter as claimed in claim 2 characterised in that said temperature sensor is associated with said means for measuring the water in the chamber (7).
4. A filter as claimed in claim 2 characterised in that said water level measurement means comprise a sensor positioned in the collection chamber to generate an electrical signal when the water level reaches a predetermined maximum value, said signal being fed to an electronic card.
5. A filter as claimed in claim 4 characterised in that said sensor means comprises a float positioned in the collection chamber and having a specific gravity between the specific gravity of water and that of the fuel, and a float guide stem in the interior of which there is positioned a magnetic field sensor connected electrically to said electronic card by two conductors.

6 A filter as claimed in claim 5 characterised in that said temperature sensor is positioned in the interior of said stem in proximity to its free end, and is connected electrically to said card by two conductors.

7 A filter as claimed in claim 6 characterised in that one of the
5 conductors connecting said temperature sensor to said card is also connected to said magnetic field sensor.

8 A filter as claimed in claim 1, characterised in that said temperature sensor is of NTC type.

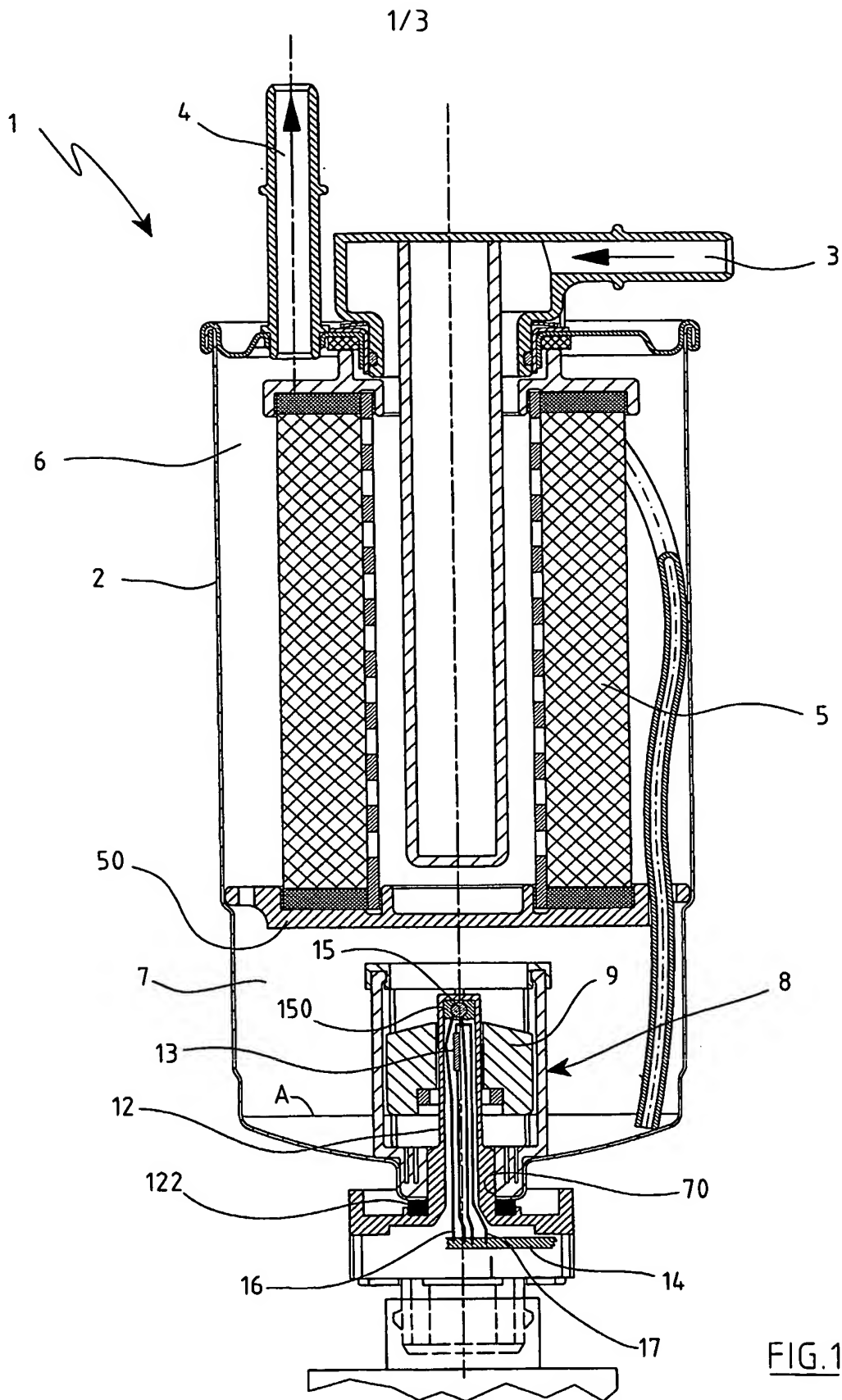
9 A filter as claimed in claim 1, characterised in that said temperature
10 sensor is embedded in a layer of conductive resin.

AMENDED CLAIMS

[received by the International Bureau on 21 April 2004 (21.04.04);
original claims 1-5 replaced by new claims 1-5; original
claims 6-9 cancelled; (2 pages)]

1. A fuel filter for diesel engines with high pressure direct injection of common rail type and the like, comprising an outer casing provided with a fuel inlet conduit (3) and an outlet conduit (4), and internally housing a filter means, said casing comprising an upper chamber (6) for containing said filter means, a lower chamber (7) communicating with said upper chamber to collect the water which said filter means (5) separates from the fuel, and means (8) for measuring the level of the water collected in the lower chamber (7), characterised in that said means for measuring the water level in the chamber (7) comprise a temperature sensor for generating an electrical signal, said signal being fed to an electronic card by two conductors.
- 2 A filter as claimed in claim 1 characterised in that said level sensor means comprises a float positioned in the collection chamber and having a specific gravity between the specific gravity of water and that of the fuel, and a float guide stem in the interior of which there is positioned a magnetic field sensor connected electrically to said electronic card by two conductors, said temperature sensor means being positioned in the interior of said stem in proximity to its upper free end.
- 3 A filter as claimed in claim 2 characterised in that one of the conductors connecting said temperature sensor means to said card is also connected to said magnetic field sensor.

- 4 A filter as claimed in claim 1, characterised in that said temperature
sensor is of NTC type.
- 5 A filter as claimed in claim 1, characterised in that said temperature
5 sensor is embedded in a layer of conductive resin.



2/3

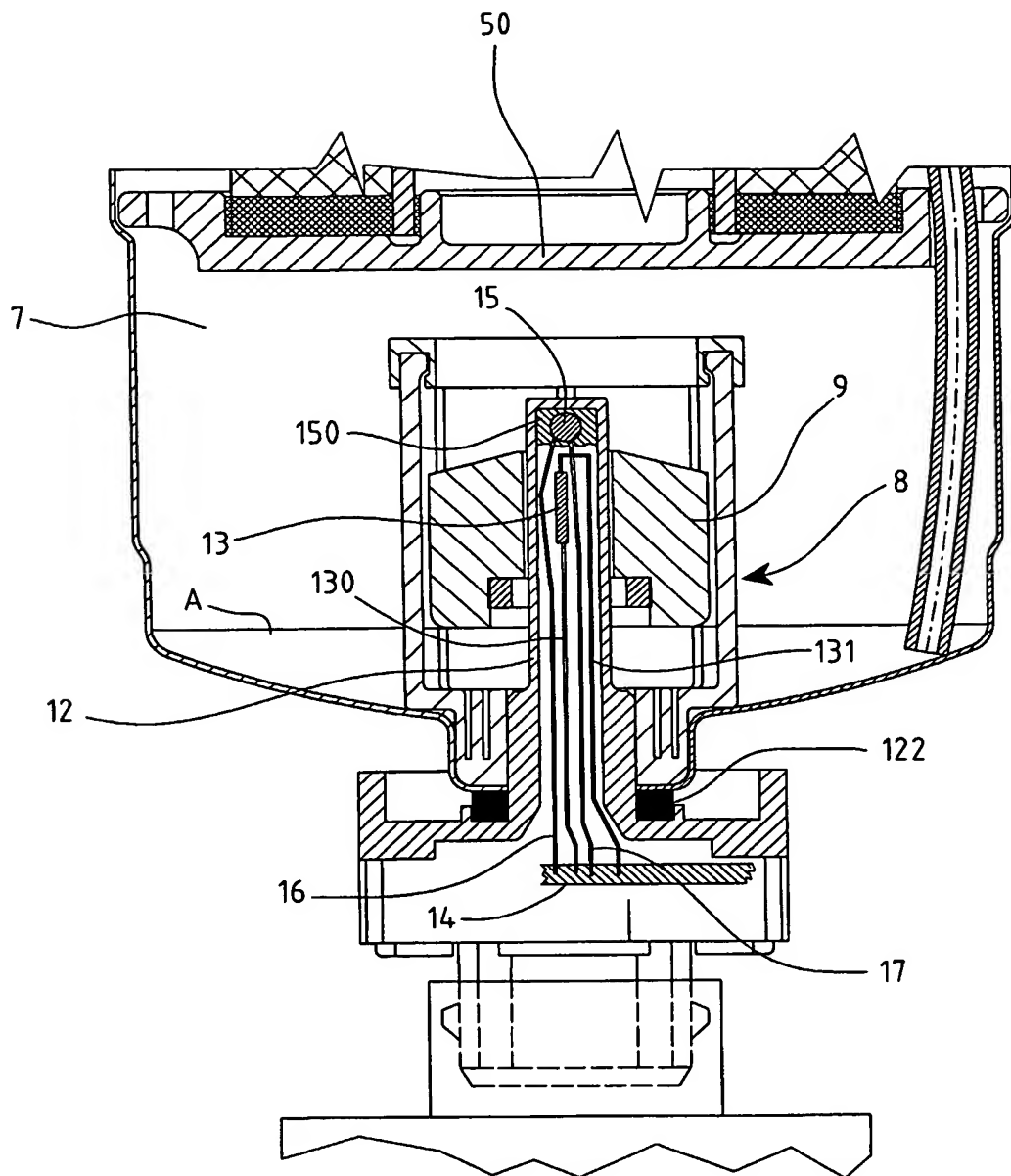


FIG.2

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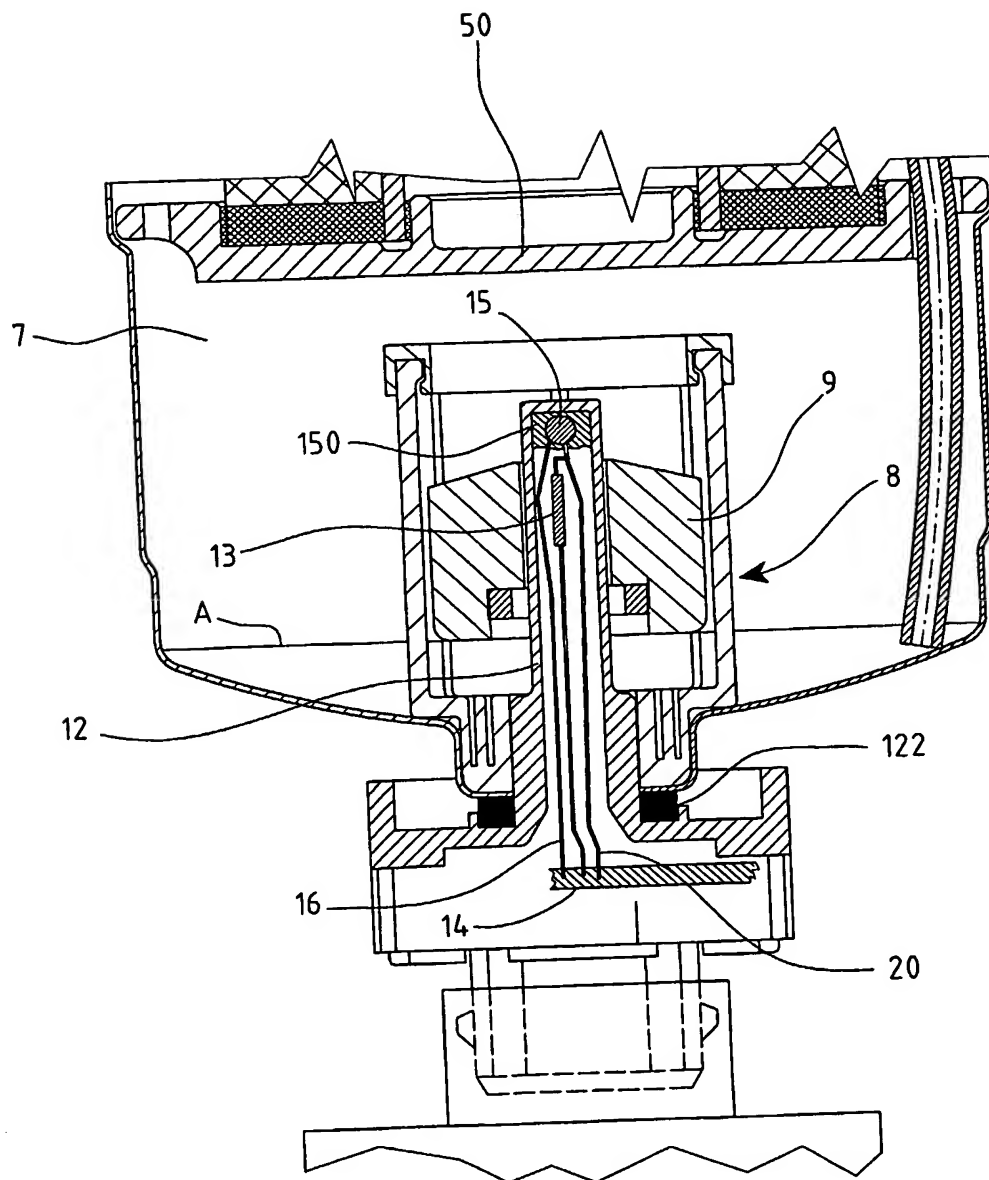


FIG. 3

FUEL FILTER FOR DIESEL ENGINES WITH HIGH PRESSURE DIRECT INJECTION OF COMMON RAIL TYPE AND THE LIKE

ABSTRACT

- 5 Fuel filter for diesel engines with high pressure direct injection of common rail type and the like, comprising an outer casing provided with a fuel inlet conduit (3) and an outlet conduit (4), and containing in its interior a filter means (5), a temperature sensor (15) being positioned in proximity to the bottom of said casing to measure the temperature of the fuel present in
- 10 the casing.

INTERNATIONAL SEARCH REPORT

International Application No
PCT/EP 03/12059

A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 F02M37/22

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 F02M

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 4 580 542 A (KAWABATA) 8 April 1986 (1986-04-08) the whole document	1,2,4,5, 9
X	US 4 321 136 A (MATSUI) 23 March 1982 (1982-03-23) the whole document	1-4
X	US 4 680 110 A (DAVIS) 14 July 1987 (1987-07-14) column 4, line 24 -column 5, line 47; figures 3,4	1,2

☐ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

* Special categories of cited documents:

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X document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

Y document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

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US 4321136	A	23-03-1982	JP 56004653 U CA 1137842 A1	16-01-1981 21-12-1982
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